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THE SEBAGO POTATO, A NEW VARIETY RESISTANT TO LATE BLIGHT

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United States Department of Agriculture, Bureau of Plant Industry, in cooperation with the Maine Agricultural Experiment Station

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ORIGIN

In 1932, a year when the estimated losses of potatoes from late blight in Maine alone were over 9 million bushels in spite of the fact that intensive spray programs were carried on throughout the State, 700 seedling varieties with a large number of Green Mountain checks were grown in an unsprayed plot at Presque Isle, Maine, to test them for blight resistance. Owing to the severity of the epidemic, nearly all the seedling varieties and all the Green Mountain checks were killed. None of the seedling varieties were free from the disease, but a small number showed infection on only a few leaves. Several of these were given further tests for blight resistance, yield, market quality, and cooking quality.

Seedling No. 44488, herein named the Sebago, proved to be the most promising of this group; and while it is not as highly resistant to late blight as is to be desired, it is so much more resistant than the commonly grown commercial sorts that it should fill a need in sections where blight epidemics frequently prevail and where spray programs have become a considerable item in the labor and cost of producing potatoes.

The pedigree of Sebago is given below.

Sebago (U. S. D. A. seedling No. 44488).
- Katahdin
  - U. S. D. A. seedling No. 24642.
    - Sutton Flourball.
    - Aroostook Wonder.
  - U. S. D. A. seedling No. 40568.
    - Busola.
    - Rural New Yorker No. 2.
- Chippewa (same parentage as Katahdin).

DESCRIPTION

Plants large, erect to spreading; stems thick, prominently angled; nodes slightly swollen, green; internodes reddish purple; wings much waved, green; stipules medium in size, green, sparsely pubescent; leaves medium in length, broad, open, midrib green, pubescent (medium); primary leaflets three pairs, broadly ovate, large, mean length of blade 45.68 ± 0.39 [1] mm (1.80 inches), mean width 26.56 ± 0.29 mm (1.05 inches), index 58.38 [2] ± 0.29; leaflet petioles green; secondary leaflets medium in number, on midrib between pairs of primary leaflets, tertiary leaflets few; inflorescence little branched; leafy bracts none; peduncles medium in length, slightly pigmented, pubescent; pedicels medium in length, slightly pigmented, pubescent.

Flowers.—Calyx lobe tips medium in length, pigmented, pubescent; corolla medium in size, reddish purple (corresponding to Ridgway's [3] rose purple); anthers orange yellow; pollen scant, poor; style straight, stigma globose, multilobed, green.

Tubers.—Elliptical to round-elliptical, medium thick, mean length 81.62 ± 0.63 mm (3.22 inches)[4]; mean width 78.03 ± 0.41 mm (3.07 inches);[4] mean thickness 63.50 ± 0.46 mm (2.50 inches);[4] indexes, width to length 96.42 ± 1.07,[5] thickness to width 81.69 ± 0.72,[6] thickness to length 78.67 ± 1.11;[6] skin smooth, self-colored, ivory yellow;[3] eyes shallow, same color as skin, eyebrows short, curved, medium prominent; flesh white; sprouts, color when developed in dark, trace of rosolane pink;[3] maturity late.

CHARACTERISTICS

The Sebago potato is a vigorous-growing variety (fig. 1) which produces comparatively large yields of smooth, nearly round tubers with shallow eyes (fig. 2). The color of the tubers is ivory yellow, classed as white by the commercial trade. It is highly resistant if not immune to mild mosaic under field conditions at Presque Isle. During the 7 years it has been grown not a plant has shown mild mosaic. In a single test where the Sebago was grown between rows of Green Mountain, known to have mild mosaic, none of the plants of the Sebago became diseased. A few plants infected with vein-banding mosaic have been found in the field plots. In the more severe tuber graft tests, however, it contracts latent and vein-banding mosaic. It is not resistant to two other virus diseases, leaf roll and spindle tuber, but is no more susceptible to these than any of the other commercial varieties. It is resistant enough to late blight to be grown in most seasons in Maine without spraying, and in seasons of severe epidemics it would require fewer applications of bordeaux mixture than the Green Mountain.

Sebago and Green Mountain grown on the Aroostook Farm at Presque Isle were both classed as good for cooking quality, as shown by tests conducted for 2 years at Washington, D. C., in cooperation with the Bureau of Home Economics, United States Department of Agriculture.

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[1] Standard error.

[2] Calculated by dividing the width of each of 100 leaflets by their length and multiplying the average of these ratios by 100. The leaflets were taken from the fourth leaf from the top of the stem, one leaflet, the distal left lateral, being taken from each leaf. Since the potato leaflet is asymmetrical, the length was determined by taking the average of the measurements from the apex of the blade to the base of each respective lobe. This is a modification of the method described in the following work: SALAMAN, R. N. POTATO VARIETIES. 378 pp., illus. Cambridge. 1926. See pp. 163–170.

[3] RIDGWAY, R. COLOR STANDARDS AND COLOR NOMENCLATURE. 43 pp., illus. Washington, D. C. 1912.

[4] Average of measurements of 100 tubers, each of a weight of approximately 8 ounces (223–233 g).

[5] Calculated by dividing the width of each 100 tubers by their length and multiplying the average of these ratios by 100. The data used for calculating the indexes were taken from the same measurements as those used to designate the dimensions of the tubers.

[6] Based on the measurements of the same tubers as those used for determining the width-to-length index, using the same methods of calculation.

FIGURE 1.—A field of Sebago potatoes.

FIGURE 2.—Tubers of the Sebago variety.

ADAPTATION AND COMPARISONS

The Sebago has been tested in several States to determine its adaptation. At Presque Isle, it has been tested for yield for 6 years (1932 to 1937) in comparison with Green Mountain, Katahdin, and Chippewa, and for 5 years (1933 to 1937) with No Blight, a blight-resistant variety introduced to the trade in Maine a number of years ago under the name "Foster's Rustproof." The yield data for these tests are given in table 1.

TABLE 1.—*Yields, and percentage of U. S. No. 1 tubers, of Sebago and 4 other late varieties, Presque Isle, Maine, 1932–37*

Variety	Acre yield							Tubers grading U. S. No. 1
	1932	1933	1934	1935	1936	1937	Mean,[1] 6 years	
	Bushels	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Percent*
Green Mountain	358	233	435	354	518	405	384	92.3
Katahdin	383	195	445	269	432	274	333	93.0
Chippewa	392	204	487	310	480	372	374	90.4
Sebago	433	243	504	317	492	351	390	93.5
No Blight		134	447	198	330	258	273	[2] 73.7

[1] Twice the standard error of a difference between means is 25 bushels.
[2] 5-year average.

If twice the standard error of a difference, 25 bushels per acre, is taken as the limits of experimental error, Sebago far outyields No Blight. It also outyields its Katahdin parent, but in yield of U. S. No. 1 tubers it is in the same class with its other parent, Chippewa, and the Green Mountain check. The yield test plots from which the data in table 1 were secured were all carefully sprayed with bordeaux mixture. Under these conditions the susceptible varieties were not at a disadvantage. When plots were grown without spray the results were quite different, as shown in a test made in 1936 by Reiner Bonde, of the Maine Agricultural Experiment Station. The data for this test are given in table 2.

TABLE 2.—*Yields, and percentage of U. S. No. 1 tubers, of Green Mountain, Sebago, and No Blight varieties grown in an unsprayed plot and subjected to a severe blight epidemic at Presque Isle, Maine, in 1936*

Variety	Acre yield	Tubers grading U. S. No. 1	Tuber decay
	Bushels	*Percent*	
Green Mountain	140	70	Extensive, 50 percent or more.
Sebago	308	86	None noted.
No Blight	330	73	Do.

Green Mountain, the variety susceptible to blight, was grown in an unsprayed plot in comparison with Sebago and No Blight. They were grown in a very wet soil, favorable for blight and tuber decay, and a heavy blight epidemic prevailed early in the growing season. The result was that the Green Mountain foliage, not being protected by

spray, was killed early. Sebago and No Blight, however, were not severely injured, although both developed some infected foliage. The tubers of Green Mountain decayed badly, 50 percent or more of them showing rot at harvesttime. In contrast to this, no tuber decay was found on Sebago or No Blight. The resistant varieties far outyielded the Green Mountain in this test. There was no significant difference in yield between the Sebago and No Blight if the standard error of the experiment is considered.

The market quality of the Sebago tubers was far superior to that of No Blight, because the latter variety produced a large number of undersized tubers that just made the grade, whereas Sebago produced very few small ones and the general appearance of the U. S. No. 1's was excellent.

Sebago was tested in five different locations in New York in 1937 in cooperation with E. V. Hardenburg, of the Department of Vegetable Crops, Cornell University. The data for these tests are given in table 3.

TABLE 3.—*Comparative yields of Sebago and 4 other late varieties grown in 5 counties in New York State in 1937*

Variety	Acre yield in counties and on soils indicated					
	Clinton	Oswego (muck)	Suffolk	Tompkins	Wayne (muck)	Mean, 5 counties
	Bushels	*Bushels*	*Bushels*	*Bushels*	*Bushels*	*Bushels*
Green Mountain	469	402	213	443	405	386
Katahdin	485	310	170	305	344	323
Chippewa	574	430	233	250	380	373
Sebago	458	394	233	425	404	383
Russet Rural	372	376	----	368	389	----

The data in table 3 show that the mean yield of Green Mountain exceeded that for Sebago by only 3 bushels for the five tests, a difference of 68 bushels being necessary to give odds of 19 : 1 that they are different. In four tests the Sebago consistently outyielded the Russet Rural, but because of the small number of comparisons, odds are only about 4 : 1 that the two varieties are different in yielding ability. Although the data for a small number of tests are inconclusive, they do show that the Sebago is potentially a high-yielding variety in a number of places in New York State.

The Sebago is being tested in other sections of the United States, but since it is a late variety, it is likely that it will be better adapted to late-potato sections than to the early producing ones and that it will be especially valuable in the parts of these sections that are subject to frequent epidemics of late blight.

DISSEMINATION

It should be understood that for the last 6 years the Sebago variety has been in the testing stages and no serious attempt has been made to increase the seed stock. As a result the combined stock of the Maine Agricultural Experiment Station and the United States Department of Agriculture does not exceed 1,500 bushels.

SUMMARY

The Sebago is a new variety of potato selected for its blight resistance from a cross of Chippewa × Katahdin. In repeated tests for 7 years it has proved to be moderately resistant to late blight and highly resistant to mild mosaic under field conditions. It is as susceptible to spindle tuber and leaf roll as any of the commonly grown commercial varieties.

It is a vigorous-growing variety that produces comparatively high yields of tubers of high market and cooking quality. It seems to be adapted to environmental conditions in Maine and certain locations in New York. Because of its lateness it will probably be better adapted to late-potato sections than to early-producing ones. It ought to be especially valuable in the parts of late-potato sections that are subject to epidemics of late blight that cause serious losses in spite of attempts to control the disease by spraying.

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